

REMARKS

Applicants thanks Examiner for their detailed review of the application.

Examiner objected to the drawings as failing to comply with 37 CFR 1.84(p)(5). Applicant has submitted herewith replacement figures which have the reference character 215 removed. In addition, reference sign 605 has been added above the arrows of Figure 6 to match the description.

Examiner objects to claims 3-7, 14, and 24 due to informalities. In addition, claims 3-7 have been rejected under 35 U.S.C. 112 second paragraph, since they depended from a cancelled claim. Claims 3-7 and 12 have been amended to depend from claim 1 and each other accordingly to rectify being orphaned by cancellation of claim 2. Amendment to claim 14 has removed reference to aerogel, and the spellings as reflected by the examiner have been corrected in claim 24.

Examiner rejects claims 1, 3-16, and 18-28 under 35 U.S.C. 112 first paragraph, as failing to comply with the written description requirement. Claim 1 has been amended to include, “wherein a second amount of the liquid remains in the wet-gel zeolite composite film,” which does not include reference to a range of liquid extracted. However, as applicant states in paragraph 0021, “all of the liquid may be extracted to form the zeolite-sol colloid to form an aerogel-zeolite composite.” Therefore, it is readily apparent, as a second amount of liquid remains in the film, the film is a wet-gel, “so as not to crack during hardening or further processing steps,” as further disclosed in applicant’s paragraph 0021. In applicant’s claim 1, further limitations of opening a via and a trench, forming a conductive material, and depositing an ILD all reference the wet-gel zeolite composite.

As stated above, applicant specifically discloses in paragraph 0021, “For example a small amount of liquid may be extracted leaving the wet gel viscous and pliable, so as not to crack during hardening or **further processing steps**.” Later, applicant discloses examples of “further damascene processing,” at paragraph 0026. Applicant utilizes aerogel – zeolite composite ILD 710 to illustrate further processing, and explicitly states in the next sentence of paragraph 0026, “However, it is

readily apparent that any amount of liquid may be removed from a liquid sol – zeolite colloid to form either a wet gel, an aerogel, or anywhere in between a wet gel and aerogel composite with zeolite depending on the properties desired.” The description then continues to discuss examples such as opening via 705 and trench 710, forming conductive material 810, and chemical mechanical polish. Claims 25 and 26 have been amended to remove reference to a surfactant and replaced with reference to an acid.

Examiner rejected claims 1, 3-4, 6, 8, 9, 11, 15, and 17-27 under 35 U.S.C. 102(c) as being anticipated by Ogihara et al. (U.S. publication 20040091419). In addition, claims 12-14 and 28 are rejected under 35 U.S.C 103(a) as being unpatentable over Ogihara in view of US 6,808,867, hereinafter Doshi. Applicant’s claim 1 as amended includes, “extracting a first amount of the liquid from the zeolite – sol colloid to form a wet gel – zeolite composite film, wherein a second amount of the liquid remains in the wet-gel zeolite composite film,” as well as the additional limitation of, “opening a via and a trench in the wet-gel zeolite composite.” As stated previously, Ogihara at col. 7 paragraph 0101 discloses:

The thin film thus prepared may be preferably heated for several minutes at 50 to 150 degrees C in a drying process (generally called a pre-bake in the semiconductor process) in an attempt to remove the solvent. A porous film is finally obtained.

Examiner states that Ogihara does not teach the temporal relationship between the patterning and calcination. In fact, Ogihara attempts to remove the solvent, not perform etching or opening of a via and a trench in a wet gel – zeolite composite, as in applicant’s claim 1. In fact, Ogihara explicitly teaches away from retaining a wet-gel, as Ogihara states the heating is in an attempt to **remove the solvent.**” Therefore, combination of Ogihara and Doshi is impermissible, as Ogihara explicitly teaches away from use of a wet-gel, while Doshi explicitly utilizes a wet-gel for patterning.

Additionally, Doshi does not disclose the limitations of claim 1 including, “forming a conductive material in the via and the trench of the wet-gel zeolite composite;

and depositing an ILD on the wet-gel zeolite composite.” Doshi’s example at column 9 lines 53-60 includes the following:

Films were deposited on (100)-silicon by dip-coating at 25.4 cm/min. Following film deposition, the samples were irradiated with short-wave ultraviolet (UV) light for 2 h through a mask via proximity printing to effectively transfer the pattern onto the silica thin film. Etching of the films was carried out with a 0.2 M NaOH solution. These films were then calcined at 450° C. for 3 h at a ramp rate of 1° C./min to burn out the organics, drive the structural transformation and give a true mesoporous film, see FIG. 10.

As can be seen, after etching the films are calcined to burn out the organics; however, there is no mention or suggestion of forming a conductive material or depositing an ILD while the film is a wet-gel – zeolite composite film.

As stated above, combination of Ogihara and Doshi would not only be impermissible, but the combination does not teach or suggest all the limitations of applicant’s claim 1. Therefore, applicant respectfully submit that claim 1 and its dependent claims 3-16, and 18-28 are now in condition for allowance for the reasons stated above.

If there are any additional charges, please charge Deposit Account No. 50-0221. If a telephone interview would in any way expedite the prosecution of the present application, the Examiner is invited to contact David P. McAbee at (503) 712-4988.

Respectfully submitted,
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